SEQUENCE LISTING

<110> BARBAS, Carlos F.
RADER, Christoph

<120> HUMANIZATION OF MURINE ANTIBODY

<130> TSRI 598.0 Con.1

<140> 10/078,757
<141> 2002-02-19

<150> US 08/986,016
<151> 1997-12-05

<160> 122

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1 5

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cgcacagtaa tacacggccg tgtc 24

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<400> 26
Asp Thr Ala Val Tyr Tyr Cys Ala
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Asp Thr Ala Met Tyr Tyr Cys Ala
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1 5

<210> 34
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<212> PRT
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 1   5

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<213> Artificial Sequence

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Asp Glu Ala Asp Tyr Tyr Cys
 1   5

<210> 38
<211> 7
<212> PRT
<213> Homo Sapiens

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Phe Gly Gly Gly Thr Lys Leu
 1   5

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<400> 39
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<400> 43
gaggaggagg aggaggagcc tggccggcct ggccactagt g 41

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<213> Mus Musculus

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Leu Ser Cys Ala Ala Ser Gly Phe Ala Phe Ser Ser Tyr Asp Met Ser
            20   25   30
Trp Val Arg Gln Ile Pro Glu Lys Arg Leu Glu Trp Val Ala Lys Val
        35   40   45
Ser Ser Gly Gly Gly Ser Thr Tyr Tyr Leu Asp Thr Val Gln Gly Arg
    50   55   60
Phe Thr Ile Ser Arg Asp Asn Ala Lys Asn Thr Leu Tyr Leu Gln Met
65   70   75   80
Ser Ser Leu Asn Ser Glu Asp Thr Ala Met Tyr Tyr Cys Ala Arg His
                85   90   95
Asn Tyr Gly Ser Phe Ala Tyr Trp Gly Gln Gly Thr Leu Val Thr Val
            100   105   110
Ser Ala Ala Lys Thr Thr Pro Pro Ser Val Tyr Pro Leu Ala Pro Gly
        115   120   125
Ser Ala
    130

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<213> Mus Musculus

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Glu Leu Val Met Thr Gln Thr Pro Ala Thr Leu Ser Val Thr Pro Gly
 1   5   10   15
Asp Ser Val Ser Leu Ser Cys Arg Ala Ser Gln Ser Ile Ser Asn His
            20   25   30
Leu His Trp Tyr Gln Gln Lys Ser His Glu Ser Pro Arg Leu Leu Ile
        35   40   45
Lys Tyr Ala Ser Gln Ser Ile Ser Gly Ile Pro Ser Arg Phe Ser Gly
    50   55   60
Ser Gly Ser Gly Thr Asp Phe Thr Leu Ser Ile Asn Ser Val Glu Thr
65   70   75   80
Glu Asp Phe Gly Met Tyr Phe Cys Gln Gln Ser Asn Ser Trp Pro His
                85   90   95
Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg Ala
            100   105

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<211> 23
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<220>
<223> Synthetic PCR Primer

<400> 47
cctcaccgtt tggccagggg acc 23

<210> 48
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
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<400> 48
agaagcgtag tccggaacgt c 21

<210> 49
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<213> Artificial Sequence

<220>
<223> Hybrid mouse - human sequence

<400> 49

Glu	Leu	Val	Met	Thr	Gln	Ser	Pro	Glu	Phe	Gln	Ser	Val	Thr	Pro	Lys
1				5				10					15		
Glu	Thr	Val	Thr	Ile	Thr	Cys	Arg	Ala	Ser	Gln	Asp	Ile	Gly	Thr	Ser
			20					25					30		
Leu	His	Trp	Tyr	Gln	Gln	Lys	Pro	Gly	Gln	Ser	Pro	Lys	Leu	Leu	Ile
		35					40					45			
Lys	Tyr	Ala	Ser	Gln	Pro	Val	Phe	Gly	Val	Pro	Ser	Arg	Phe	Arg	Gly
	50					55					60				
Ser	Gly	Ser	Gly	Thr	Asp	Phe	Thr	Leu	Thr	Ile	Tyr	Ser	Leu	Glu	Ala
65					70					75					80
Glu	Asp	Phe	Ala	Val	Tyr	Tyr	Cys	Gln	Gln	Ser	Asn	Ser	Trp	Pro	His
				85					90					95	

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Thr Phe Gly Gln Gly Thr Lys Leu Glu Ile Lys Arg Thr
            100                 105


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<213> Artificial Sequence

<220>
<223> Hybrid mouse - human sequence

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Gln Val Gln Leu Gln Glu Ser Gly Pro Gly Leu Val Lys Pro Ser Gln
 1               5                  10                  15
Thr Leu Ser Leu Thr Cys Thr Val Ser Gly Ala Ser Ile Ser Arg Gly
            20                  25                  30
Gly Tyr Tyr Trp Ser Trp Ile Arg Gln Tyr Pro Gly Lys Gly Leu Glu
        35                  40                  45
Trp Ile Gly Tyr Ile His His Ser Gly Ser Thr Tyr Tyr Asn Pro Ser
    50                  55                  60
Leu Lys Ser Arg Val Thr Ile Ala Ile Asp Thr Ser Lys Asn Gln Leu
65                  70                  75                  80
Ser Leu Arg Leu Thr Ser Val Thr Ala Ala Asp Thr Ala Val Tyr Tyr
                85                  90                  95
Cys Ala Arg His Asn Tyr Gly Ser Phe Ala Tyr Trp Gly Gln Gly Thr
            100                 105                 110
Leu Val Thr Val Ser Ser
        115


<210> 51
<211> 118
<212> PRT
<213> Artificial Sequence

<220>
<223> Hybrid mouse - human sequence

<400> 51
Gln Val Gln Leu Gln Glu Ser Gly Pro Gly Leu Val Lys Pro Ser Gln
 1               5                  10                  15
Thr Leu Phe Leu Thr Cys Thr Val Ser Gly Gly Ser Ile Ser Ser Gly
            20                  25                  30
Gly Tyr Tyr Trp Ser Trp Ile Arg His His Pro Gly Lys Gly Leu Glu
        35                  40                  45
Trp Ile Gly Tyr Ile His His Arg Ala Ala Pro Tyr Tyr Asn Pro Ser
    50                  55                  60
Leu Lys Ser Arg Val Thr Ile Ser Val Asp Thr Ser Arg Asn Gln Ile
65                  70                  75                  80
Ser Leu Lys Leu Arg Ser Val Thr Ala Ala Asp Thr Ala Val Tyr Tyr
                85                  90                  95
Cys Ala Arg His Asn Tyr Gly Ser Phe Ala Tyr Trp Gly Gln Gly Thr
```

```
            100                 105                 110
Leu Val Thr Val Ser Ser
        115
```

<210> 52
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<212> PRT
<213> Artificial Sequence

<220>
<223> Hybrid mouse - human sequence

<400> 52

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Gln Val Gln Leu Gln Glu Ser Gly Pro Gly Leu Val Lys Pro Ser Glu
 1               5                  10                  15
Thr Leu Ser Leu Thr Cys Thr Val Ser Gly Gly Ser Ile Ser Ser Gly
            20                  25                  30
Gly Tyr Tyr Trp Ser Trp Ile Arg Gln His Pro Gly Lys Gly Leu Glu
        35                  40                  45
Trp Ile Gly Tyr Ile His His Ser Ala Gly Thr Tyr Tyr Asn Pro Ser
    50                  55                  60
Leu Lys Ser Arg Val Thr Met Ser Val Asp Thr Ser Lys Asn Gln Leu
65                  70                  75                  80
Ser Leu Lys Leu Thr Ser Val Thr Ala Ala Asp Thr Ala Val Tyr Tyr
                85                  90                  95
Cys Ala Arg His Asn Tyr Gly Ser Phe Ala Tyr Trp Gly Gln Gly Thr
            100                 105                 110
Leu Val Thr Val Ser Ser
        115
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<210> 53
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<220>
<223> Hybrid mouse - human sequence

<400> 53

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Gln Val Gln Leu Gln Glu Ser Gly Pro Gly Leu Val Lys Pro Ser Glu
 1               5                  10                  15
Thr Leu Ser Leu Thr Cys Ser Val Ser Gly Gly Ser Ile Ser Ser Gly
            20                  25                  30
Gly Tyr Tyr Trp Ser Trp Ile Arg His His Pro Gly Lys Gly Leu Glu
        35                  40                  45
Trp Ile Gly Tyr Ile His His Ser Ala Gly Thr Tyr Tyr Asn Pro Ser
    50                  55                  60
Leu Lys Ser Arg Val Thr Met Ser Ala Asp Thr Ser Lys Asn Gln Leu
65                  70                  75                  80
Ser Leu Lys Leu Ala Ser Val Thr Ala Ala Asp Thr Ala Val Tyr Tyr
                85                  90                  95
```

Cys Ala Arg His Asn Tyr Gly Ser Phe Ala Tyr Trp Gly Gln Gly Thr
100 105 110
Leu Val Thr Val Ser Ser
115

<210> 54
<211> 117
<212> PRT
<213> Artificial Sequence

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<223> Hybrid mouse - human sequence

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Ser Val Arg Val Ser Cys Lys Ala Ser Gly Gly Thr Phe Ser Gly Phe
20 25 30
Ala Val Ser Trp Val Arg Gln Ala Pro Gly Gln Arg Phe Glu Trp Leu
35 40 45
Gly Gly Ile Val Ala Ser Leu Gly Ser Thr Asp Tyr Ala Gln Lys Phe
50 55 60
Gln Asp Lys Leu Thr Ile Thr Val Asp Glu Ser Thr Ala Thr Val Tyr
65 70 75 80
Met Glu Met Arg Asn Leu Arg Ser Asp Asp Thr Ala Val Tyr Tyr Cys
85 90 95
Ala Arg His Asn Tyr Gly Ser Phe Ala Tyr Trp Gly Gln Gly Thr Leu
100 105 110
Val Thr Val Ser Ser
115

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<220>
<223> Hybrid mouse - human sequence

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Glu Leu Val Met Thr Gln Ser Pro Glu Phe Gln Ser Val Thr Pro Lys
1 5 10 15
Glu Thr Val Thr Ile Thr Cys Arg Ala Ser Gln Asp Ile Gly Asn Ser
20 25 30
Leu His Trp Tyr Gln Gln Lys Pro Gly Gln Ser Pro Lys Leu Leu Ile
35 40 45
Lys Tyr Ala Ser Gln Pro Val Phe Gly Val Pro Ser Arg Phe Arg Gly
50 55 60
Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Arg Leu Glu Pro
65 70 75 80
Glu Asp Phe Ala Val Tyr Tyr Cys Gln Gln Ser Asn Ser Trp Pro His

```
                85                  90                  95
Thr Phe Gly Gln Gly Thr Lys Leu Glu Ile Lys Arg Thr
            100                 105
```

<210> 56
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<213> Homo Sapiens

<400> 56

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 1               5                  10                  15
Ser Leu Lys Leu Ser Cys Ala Ala Ser Gly Phe Ala Phe Ser Ser Tyr
            20                  25                  30
Asp Met Ser Trp Val Arg Gln Ile Pro Glu Lys Arg Leu Glu Trp Val
        35                  40                  45
Ala Lys Val Ser Ser Gly Gly Gly Ser Thr Tyr Tyr Leu Asp Thr Val
    50                  55                  60
Gln Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys Asn Thr Leu Tyr
65                  70                  75                  80
Leu Gln Met Ser Ser Leu Asn Ser Glu Asp Thr Ala Met Tyr Tyr Cys
                85                  90                  95
Ala Arg His Asn Tyr Gly Ser Phe Ala Tyr Trp Gly Gln Gly Thr Leu
            100                 105                 110
Val Thr Val Ser Ala
        115
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<210> 57
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<213> Homo Sapiens

<400> 57

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<210> 58
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<213> Homo Sapiens

<400> 58

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Glu Arg Gly Ser
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<210> 59
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<400> 59
Ser Ser Thr Leu Ala
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<210> 60
<211> 5
<212> PRT
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<400> 60
Ser Ser Phe Leu Ala
1 5

<210> 61
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<400> 61
Val Thr Ser Ser Tyr Leu Ala
1 5

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Pro Gly Gln Ala
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Pro Gly Lys Ala
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Ser Arg Ala Thr

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Lys Tyr Ala Ser Gln Ser Ile Ser
1 5

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<212> PRT
<213> Homo Sapiens

<400> 67
Arg Ala Ser Gln Asp Ile Gly Thr
1 5

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<212> PRT
<213> Homo Sapiens

<400> 68
Lys Tyr Ala Ser Gln Pro Val Phe
1 5

<210> 69
<211> 8
<212> PRT
<213> Homo Sapiens

<400> 69
Arg Ala Ser Gln Asp Ile Gly Asn
1 5

<210> 70
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<400> 70
Arg Ala Ser Gln Ser Ile Gly Trp
1 5

<210> 71
<211> 8
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<400> 71
Lys Tyr Ala Ser Gln Ser Ile Ser
1 5

<210> 72
<211> 8
<212> PRT
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<400> 72
Arg Ser Ser Gln Ser Ile Asn Ile
1 5

<210> 73
<211> 8
<212> PRT
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<400> 73
Tyr His Ala Ser Lys Arg Ala Ser
1 5

<210> 74
<211> 9
<212> PRT
<213> Homo Sapiens

<400> 74
Arg Ala Ser Gln Ser Val Ser Asn Asn
1 5

<210> 75
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<213> Homo Sapiens

<400> 75
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1 5

<210> 76
<211> 13
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<400> 76
Arg Ser Ser Gln Ser Leu Val Tyr Ser Asp Gly Asn Thr
1 5 10

<210> 77
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<213> Homo Sapiens

<400> 77
Tyr Lys Val Ser Asn Arg Asp Ser
1 5

<210> 78
<211> 13
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<213> Homo Sapiens

<400> 78
Tyr Ala Ser Gln Ser Leu Val Tyr Thr Asp Gly Asn Thr
1 5 10

<210> 79
<211> 8
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<400> 79
Tyr Met Val Ser Asn Arg Asp Ser
1 5

<210> 80
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<213> Mus Musculus

<400> 80

Glu Leu Val Met Thr Gln Thr Pro Ala Thr Leu Ser Val Thr Pro Gly
1 5 10 15
Asp Ser Val Ser Leu Ser Cys
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<210> 81
<211> 23
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<213> Homo Sapiens

<400> 81
Glu Leu Val Met Thr Gln Ser Pro Glu Phe Gln Ser Val Thr Pro Lys
1 5 10 15
Glu Thr Val Thr Ile Thr Cys
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<213> Mus Musculus

<400> 82
Arg Ala Ser Gln Ser Ile Ser Asn His Leu His
1 5 10

<210> 83
<211> 11
<212> PRT
<213> Homo Sapiens

<400> 83
Arg Ala Ser Gln Asp Ile Gly Thr Ser Leu His
1 5 10

<210> 84
<211> 11
<212> PRT
<213> Homo Sapiens

<400> 84
Arg Ala Ser Gln Asp Ile Gly Asn Ser Leu His
1 5 10

<210> 85
<211> 15
<212> PRT
<213> Mus Musculus

<400> 85
Trp Tyr Gln Gln Lys Ser His Glu Ser Pro Arg Leu Leu Ile Lys
1 5 10 15

<210> 86
<211> 15
<212> PRT
<213> Homo Sapiens

<400> 86
Trp Tyr Gln Gln Lys Pro Gly Gln Ser Pro Lys Leu Leu Ile Lys
1 5 10 15

<210> 87
<211> 7
<212> PRT
<213> Mus Musculus

<400> 87
Tyr Ala Ser Gln Ser Ile Ser
1 5

<210> 88
<211> 7
<212> PRT
<213> Homo Sapiens

<400> 88
Tyr Ala Ser Gln Pro Val Phe
1 5

<210> 89
<211> 32
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<213> Mus Musculus

<400> 89
Gly Ile Pro Ser Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr
1 5 10 15
Leu Ser Ile Asn Ser Val Glu Thr Glu Asp Phe Gly Met Tyr Phe Cys
20 25 30

<210> 90
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<212> PRT
<213> Homo Sapiens

<400> 90

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Gly Val Pro Ser Arg Phe Arg Gly Ser Gly Ser Gly Thr Asp Phe Thr
 1               5                  10                  15
Leu Thr Ile Tyr Ser Leu Glu Ala Glu Asp Phe Ala Val Tyr Tyr Cys
            20                  25                  30
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<210> 91
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<213> Homo Sapiens

<400> 91

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Gly Val Pro Ser Arg Phe Arg Gly Ser Gly Ser Gly Thr Asp Phe Thr
 1               5                  10                  15
Leu Thr Ile Ser Arg Leu Glu Pro Glu Asp Phe Ala Val Tyr Tyr Cys
            20                  25                  30
```

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<213> Mus Musculus

<400> 92

```
Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg Ala
 1               5                  10
```

<210> 93
<211> 12
<212> PRT
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<400> 93

```
Phe Gly Gln Gly Thr Lys Leu Glu Ile Lys Arg Thr
 1               5                  10
```

<210> 94
<211> 30
<212> PRT
<213> Mus Musculus

<400> 94

```
Glu Val Gln Leu Glu Glu Ser Gly Gly Gly Leu Val Lys Pro Gly Gly
 1               5                  10                  15
Ser Leu Lys Leu Ser Cys Ala Ala Ser Gly Phe Ala Phe Ser
            20                  25                  30
```

<210> 95
<211> 30
<212> PRT

<213> Homo Sapiens

<400> 95
Gln Val Gln Leu Val Gln Ser Gly Ala Glu Val Arg Lys Pro Gly Ser
1 5 10 15
Ser Val Arg Val Ser Cys Lys Ala Ser Gly Gly Thr Phe Ser
20 25 30

<210> 96
<211> 30
<212> PRT
<213> Homo Sapiens

<400> 96
Gln Val Gln Leu Gln Glu Ser Gly Pro Gly Leu Val Lys Pro Ser Gln
1 5 10 15
Thr Leu Ser Leu Thr Cys Thr Val Ser Gly Ala Ser Ile Ser
20 25 30

<210> 97
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Thr Leu Phe Leu Thr Cys Thr Val Ser Gly Gly Ser Ile Ser
20 25 30

<210> 98
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<400> 98
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Thr Leu Ser Leu Thr Cys Thr Val Ser Gly Gly Ser Ile Ser
20 25 30

<210> 99
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Thr Leu Ser Leu Thr Cys Ser Val Ser Gly Gly Ser Ile Ser
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<400> 101
Gly Phe Ala Val Ser
1 5

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<400> 102
Arg Gly Gly Tyr Tyr Trp Ser
1 5

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<400> 103
Ser Gly Gly Tyr Tyr Trp Ser
1 5

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<400> 108
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<210> 109
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<212> PRT
<213> Homo Sapiens

<400> 109
Gly Ile Val Ala Ser Leu Gly Ser Thr Asp Tyr Ala Gln Lys Phe Gln
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Asp

<210> 110
<211> 16
<212> PRT
<213> Homo Sapiens

<400> 110
Tyr Ile His His Ser Gly Ser Thr Tyr Tyr Asn Pro Ser Leu Lys Ser
1 5 10 15

<210> 111
<211> 16
<212> PRT
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<400> 111
Tyr Ile His His Arg Ala Ala Pro Tyr Tyr Asn Pro Ser Leu Lys Ser
1 5 10 15

<210> 112
<211> 16
<212> PRT
<213> Homo Sapiens

<400> 112
Tyr Ile His His Ser Ala Gly Thr Tyr Tyr Asn Pro Ser Leu Lys Ser
1 5 10 15

<210> 113
<211> 32
<212> PRT
<213> Mus Musculus

<400> 113
Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys Asn Thr Leu Tyr Leu Gln
1 5 10 15
Met Ser Ser Leu Asn Ser Glu Asp Thr Ala Met Tyr Tyr Cys Ala Arg
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<210> 114
<211> 32
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<400> 114
Lys Leu Thr Ile Thr Val Asp Glu Ser Thr Ala Thr Val Tyr Met Glu
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Met Arg Asn Leu Arg Ser Asp Asp Thr Ala Val Tyr Tyr Cys Ala Arg
20 25 30

<210> 115
<211> 32
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<400> 115
Arg Val Thr Ile Ala Ile Asp Thr Ser Lys Asn Gln Leu Ser Leu Arg
1 5 10 15
Leu Thr Ser Val Thr Ala Ala Asp Thr Ala Val Tyr Tyr Cys Ala Arg
20 25 30

<210> 116
<211> 32
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<400> 116
Arg Val Thr Ile Ser Val Asp Thr Ser Arg Asn Gln Ile Ser Leu Lys
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Leu Arg Ser Val Thr Ala Ala Asp Thr Ala Val Tyr Tyr Cys Ala Arg
20 25 30

<210> 117
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<400> 117
Arg Val Thr Met Ser Val Asp Thr Ser Lys Asn Gln Leu Ser Leu Lys
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20 25 30

<210> 118
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<400> 118
Arg Val Thr Met Ser Ala Asp Thr Ser Lys Asn Gln Leu Ser Leu Lys
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Leu Ala Ser Val Thr Ala Ala Asp Thr Ala Val Tyr Tyr Cys Ala Arg
20 25 30

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<400> 119
Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ala
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<210> 120
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<212> PRT
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<400> 120
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<223> LCDR3 variant portion

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<223> Xaa = any amino acid

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<210> 122
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<223> Xaa = any amino acid

<400> 122
Xaa Xaa Xaa Xaa Ser Phe Ala Tyr
1 5